ODSA CHI-E RN-256 Bus Protocol Variant

Revision A

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Introduction

This specification describes Revision A (or Rev A) of the CHI-E RN-256 bus protocol variant for the ODSA Transaction and Link Layer Specification for BoW Interfaces. Per that specification, the following are defined in this document:

- The inclusion or exclusion of optional fields on the bus protocol channels
- The width of each field on the bus protocol channels
- The bundling and mapping of fields into the payloads of various TLP types
- The use of the auxiliary field in the TLP header for each TLP type
- The definition of any additional TLP types for control information
- The assignment of TLP types into TLP streams

This bus protocol variant defines a CHI TLP class, and additional information about the variant is provided in the following sections.

Overview

The CHI-E RN-256 bus protocol variant supports the CHI Issue E.c bus protocol and provides a means for a request node (RN) with 256b DAT packets on one chiplet to communicate with a CHI interconnect (ICN) on another chiplet. The variant defines the following TLP classes, streams, and types as shown below:

TLP Class	TLP Stream	TLP Type	TlpHdr Type
CHI	CHIREQ	REQFLIT	0x20
	CHISNP	SNPFLIT	0x22
	CHIRSP	RSPFLIT	0x24
	CHIDAT	DATFLIT256	0x25
	None	CHICRD	0x26

CHI-E RN-256 Bus Protocol Variant

Implementations are characterized as either an *RN controller* (on the chiplet that implements a request node) or an *ICN controller* (on the chiplet that implements the CHI interconnect). The subsets of the variant supported by each are described in the remaining sections.

CHI Class

The CHI-E RN-256 bus protocol variant defines a single CHI class based on CHI Issue E.c. When encapsulated into a TLP, CHI protocol packets largely retain their specified format, as defined for each of the four virtual channels (i.e. REQ, SNP, RSP, and DAT) in the CHI specification. The following parameters apply:

- NodeIDs are 11b (the maximum allowed)
- Addresses are 52b (the maximum allowed)
- MPAM is supported
- RSVDC is *not* supported
- Data are 256b
- DataCheck is *not* supported
- Poison is supported

The variant classifies CHI TLPs into one of four TLP streams: CHIREQ, CHISNP, CHIRSP, and CHIDAT.

For CHI TLPs, the Aux field in the TLP header grants credits for the various TLP streams:

4	3	2	1	0
CHIDAT[1:0]		CHIRSP[0]	CHISNP[0]	CHIREQ[0]

A one in bits 0 through 2 indicates that a single credit has been granted for the corresponding stream, while a zero indicates that no credits have been granted. Bits 3 and 4 allow from zero to three credits to be granted for the CHIDAT stream.

A CHICRD TLP is also defined to transmit additional credits for each of the TLP streams.

An RN controller transmits the following TLP streams:

- CHIREQ
- CHIRSP
- CHIDAT

An ICN controller transmits the following TLP streams:

- CHISNP
- CHIRSP
- CHIDAT

The streams transmitted by one type of controller are received by the other type. Both types transmit and receive CHICRD TLPs (described below).

CHIREQ Stream

The CHIREQ stream consists of REQFLIT packets, described below.

REQFLIT TLP

REQFLIT TLPs are the same as REQFLIT protocol packets in the CHI specification. The format for the REQFLIT TLP is illustrated below:

REQFLIT		
Field	**Width**	**Bits**
MPAM	11	[161:151]
TraceTag	1	[150]
TagOp	2	[149:148]
ExpCompAck	1	[147]
Excl SnoopMe	1	[146]
{0b000, LPID[4:0]} PGroupID[7:0] StashGroupID[7:0] TagGroupID[7:0]	8	[145:138]
SnpAttr DoDWT	1	[137]
MemAttr	4	[136:133]
PCrdType	4	[132:129]
Order	2	[128:127]
AllowRetry	1	[126]
LikelyShared	1	[125]
NS	1	[124]
Addr	52	[123:72]
Size	3	[71:69]
Opcode	7	[68:62]
ReturnTxnID {0b0000, StashLPIDValid, StashLPID[4:0]}	12	[61:50]
StashNIDValid Endian Deep	1	[49]
ReturnNID	11	[48:38]

StashNID {0b0000, SLCRepHint[6:0]}		
TxnID	12	[37:26]
SrcID	11	[25:15]
TgtID	11	[14:4]
QoS	4	[3:0]

CHISNP Stream

The CHISNP stream consists of SNP packets, described below.

SNPFLIT TLP

SNPFLIT TLPs are the same as SNPFLIT protocol packets in the CHI specification. The format for the SNPFLIT TLP is illustrated below:

SNPFLIT		
Field	Width	Bits
MPAM	11	[118:108]
TraceTag	1	[107]
RetToSrc	1	[106]
DoNotGoToSD	1	[105]
NS	1	[104]
Addr	49	[103:55]
Opcode	5	[54:50]
FwdTxnID[9:0] {0b0000, StashLPIDValid, StashLPID[4:0]} {0b00, VMIDExt[7:0]}	12	[49:38]
FwdNID	11	[37:27]
TxnID	12	[26:15]
SrcID	11	[14:4]
QoS	4	[3:0]

CHIRSP Stream

The CHIRSP TLP stream consists of RSPFLIT packets, described below.

RSPFLIT TLP

RSPFLIT TLPs are the same as RSPFLIT protocol packets in the CHI specification. The format for the RSPFLIT TLP is illustrated below:

RSPFLIT		
Field	Width	Bits
TraceTag	1	[72]
TagOp	2	[71:70]
PCrdType	4	[69:66]
DBID[11:0] {0b0000, PGroupID[7:0]} {0b0000, StashGroupID[7:0]} {0b0000, TagGroupID[7:0]}	12	[65:54]
CBusy	3	[53:51]
FwdState[2:0] DataPull[2:0]	3	[50:48]
Resp	3	[47:45]
RespErr	2	[44:43]
Opcode	5	[42:38]
TxnID	12	[37:26]
SrcID	11	[25:15]
TgtID	11	[14:4]
QoS	4	[3:0]

CHIDAT Stream

The CHIDAT TLP stream consists of DATFLIT256 packets, described below.

DATFLIT256 TLP

DAT256 TLPs support 256b DATFLIT packets in CHI. The format for the DATFLIT256 TLP is illustrated below:

DATFLIT256		
Field	Width	Bits
Poison	4	[385:382]
Data	256	[381:126]
BE	32	[125:94]

TraceTag	1	[93]
TU	2	[92:91]
Tag	8	[90:83]
TagOp	2	[82:81]
DataID	2	[80:79]
CCID	2	[78:77]
DBID[11:0]	12	[76:65]
CBusy	3	[64:62]
{0b0, FwdState} {0b0, DataPull} DataSource[3:0]	4	[61:58]
Resp	3	[57:55]
RespErr	2	[54:53]
Opcode	4	[52:49]
HomeNID	11	[48:38]
TxnID	12	[37:26]
SrcID	11	[25:15]
TgtID	11	[14:4]
QoS	4	[3:0]

Miscellaneous TLPs

The CHI TLP class defines a CHICRD TLP that combines with the Aux field in the TLP header to grant large numbers of credits for each stream. The TLP payload for a CHICRD TLP is defined as follows:

13	12	11	9	8	6	5	3	2	0
Reserved		CHIDAT[4:2]		CHIRSP[3:1]		CHISNP[3:1]		CHIREQ[3:1]	

The TLP payload and Aux field transfer up to 15 or 31 credits via a 4b value or 5b value, respectively, formed by concatenating a field in the TLP payload with the corresponding bits in the Aux field. For example, CHIDAT[4:0] represents 0 to 31 CHIDAT credits, where bits [4:2] are expressed in the TLP payload and bits [1:0] are expressed in the Aux field.